

WHAT IS CLAIMED IS:

1 1. A method of controlling positive pressure assist to a patient during expiration,
2 comprising:
3 measuring a level of electrical activity of a patient's respiration-related muscle during
4 expiration; and
5 in response to the measured level of electrical activity, adjusting a level of positive
6 pressure assist to the patient during expiration in view of minimizing the level of electrical
7 activity of the patient's respiration-related muscle during expiration.

1 2. A method of controlling positive pressure assist to a patient as defined in claim 1,
2 wherein measuring a level of electrical activity of a patient's respiration-related muscle
3 during expiration comprises:
4 measuring a level of electrical activity of the patient's diaphragm during expiration.

1 3. A method of controlling positive pressure assist to a patient as defined in claim 1,
2 wherein adjusting a level of positive pressure assist to the patient during expiration
3 comprises:
4 adjusting a level of a ventilation feature related to a mode of mechanical ventilation
5 providing assist to a patient during expiration.

1 4. A method of controlling positive pressure assist to a patient as defined in claim 3,
2 comprising:
3 selecting the ventilation feature from the group consisting of PEEP, CPAP and
4 BiPAP.

1 5. A method of controlling positive pressure assist to a patient as defined in claim 1,
2 wherein measuring a level of electrical activity of a patient's respiration-related muscle
3 during expiration comprises:
4 measuring a level of electrical activity of the patient's respiration-related muscle
5 during each patient's expiratory phase.

1 6. A method of controlling positive pressure assist to a patient as defined in claim 1,
2 wherein measuring a level of electrical activity of a patient's respiration-related muscle
3 during expiration comprises:

4 dividing a patient's expiratory phase into a plurality of segments; and
5 measuring a level of electrical activity of the patient's respiration-related muscle
6 during each segment of the patient's expiratory phase.

1 7. A method of controlling positive pressure assist to a patient as defined in claim 3,
2 wherein adjusting a level of positive pressure assist to the patient during expiration
3 comprises:

4 comparing the level of the ventilation feature to an upper safety threshold; and
5 increasing the level of the ventilation feature by a predetermined step when the
6 comparison indicates that the level of the ventilation feature is lower than the upper safety
7 threshold.

1 8. A method of controlling positive pressure assist to a patient as defined in claim 7,
2 wherein:

3 measuring a level of electrical activity of a patient's respiration-related muscle during
4 expiration comprises measuring the level of electrical activity of the patient's respiration-
5 related muscle during expiration after the level of the ventilation feature has been increased
6 by the predetermined step; and

7 adjusting the level of positive pressure assist to the patient during expiration
8 comprises comparing a last measured level of electrical activity of the patient's respiration-
9 related muscle during expiration to a previously stored lowest measured level of electrical
10 activity of the patient's respiration-related muscle during expiration.

1 9. A method of controlling positive pressure assist to a patient as defined in claim 8,
2 wherein:

3 when the comparison between the last measured level of electrical activity and the
4 previously stored lowest measured level of electrical activity indicates that the last
5 measured level of electrical activity is lower than the previously stored lowest measured
6 level of electrical activity, storing the last measured level of electrical activity as the lowest
7 measured level of electrical activity.

1 10. A method of controlling positive pressure assist to a patient as defined in claim 8,
2 wherein adjusting a level of positive pressure assist to the patient during expiration
3 comprises:

controlling increase of the ventilation feature in relation to the comparison between the last measured level of electrical activity and the previously stored lowest measured level of electrical activity.

11. A method of controlling positive pressure assist to a patient as defined in claim 1, wherein adjusting a level of positive pressure assist to the patient during expiration comprises:

comparing a last measured level of electrical activity of the patient's respiration-related muscle during expiration to a previously measured lowest level of electrical activity of the patient's respiratory-related muscle; and

adjusting the level of positive pressure assist to the patient during expiration in relation to the comparison between the last measured level of electrical activity and the previously measured lowest level of electrical activity.

12. A method of controlling positive pressure assist to a patient as defined in claim 11, wherein adjusting the level of positive pressure assist to the patient during expiration comprises:

increasing the level of positive pressure assist to the patient during expiration when the comparison between the last measured electrical activity and the previously measured lowest level of electrical activity indicates that the electrical activity of the patient's respiratory-related muscle during expiration decreases.

13. A method of controlling positive pressure assist to a patient as defined in claim 11, wherein adjusting the level of positive pressure assist to the patient during expiration comprises:

increasing the level of positive pressure assist to the patient during expiration when the comparison between the last measured level of electrical activity and the previously measured lowest level of electrical activity indicates that the electrical activity of the patient's respiratory-related muscle during expiration has not ceased to increase.

14. A method of controlling positive pressure assist to a patient as defined in claim 11, wherein adjusting a level of positive pressure assist to the patient during expiration comprises:

4 before comparing the last measured level of electrical activity to the previously
5 stored lowest measured level of electrical activity, determining whether the last measured
6 level of electrical activity is higher than a noise level.

1 15. A method of controlling positive pressure assist to a patient as defined in claim 3,
2 comprising:

3 reducing the adjusted level of the ventilation feature;
4 monitoring the effect of reducing the adjusted level of the ventilation feature on the
5 level of electrical activity of the patient's respiration-related muscle during expiration; and
6 adjusting the level of positive pressure assist to the patient during expiration both (a)
7 in relation to the monitored effect of reducing the adjusted level of the ventilation feature on
8 the level of electrical activity of the patient's respiration-related muscle during expiration and
9 (b) in view of minimizing the level of electrical activity of the patient's respiration-related
10 muscle during expiration.

1 16. A device for controlling positive pressure assist to a patient during expiration,
2 comprising:

3 means for measuring a level of electrical activity of a patient's respiration-related
4 muscle during expiration; and

5 means for, in response to the measured level of electrical activity, adjusting a level of
6 positive pressure assist to the patient during expiration in view of minimizing the level of
7 electrical activity of the patient's respiration-related muscle during expiration.

1 17. A device for controlling positive pressure assist to a patient during expiration,
2 comprising:

3 a detector of a level of electrical activity of a patient's respiration-related muscle
4 during expiration; and

5 a controller of a level of positive pressure assist to the patient during expiration, the
6 controller being supplied with the measured level of electrical activity and controlling the
7 level of positive pressure assist to the patient during expiration in view of minimizing the
8 level of electrical activity of the patient's respiration-related muscle during expiration.

1 18. A device for controlling positive pressure assist to a patient as defined in claim
2 17, wherein the detector is:

3 a detector of a level of electrical activity of the patient's diaphragm during expiration.

1 19. A device for controlling positive pressure assist to a patient as defined in claim
2 17, wherein the controller is:

3 a controller of a level of a ventilation feature related to a mode of mechanical
4 ventilation providing assist to a patient during expiration.

1 20. A device for controlling positive pressure assist to a patient as defined in claim
2 19, wherein:

3 the ventilation feature is selected from the group consisting of PEEP, CPAP and
4 BiPAP.

1 21. A device for controlling positive pressure assist to a patient as defined in claim
2 17, wherein the detector detects a level of electrical activity of the patient's respiration-
3 related muscle during each patient's expiratory phase.

1 22. A device for controlling positive pressure assist to a patient as defined in claim
2 17, wherein the detector comprises:

3 a divider of a patient's expiratory phase into a plurality of segments; and
4 a sensor of a level of electrical activity of the patient's respiration-related muscle
5 during each segment of the patient's expiratory phase.

1 23. A device for controlling positive pressure assist to a patient as defined in claim
2 19, wherein the controller comprises:

3 a first comparator of the level of the ventilation feature to an upper safety threshold;
4 and

5 a unit for increasing the level of the ventilation feature by a predetermined step when
6 the comparison conducted by the first comparator indicates that the level of the ventilation
7 feature is lower than the upper safety threshold.

1 24. A device for controlling positive pressure assist to a patient as defined in claim
2 23, wherein:

3 the detector detects the level of electrical activity of the patient's respiration-related
4 muscle during expiration after the level of the ventilation feature has been increased by the
5 predetermined step; and

6 the controller comprises a second comparator of a last measured level of electrical
7 activity of the patient's respiration-related muscle during expiration to a previously stored
8 lowest measured level of electrical activity of the patient's respiration-related muscle during
9 expiration.

1 25. A device for controlling positive pressure assist to a patient as defined in claim
2 24, wherein the controller comprises:

3 a store for storing the last measured level of electrical activity as the lowest
4 measured level of electrical activity when the comparison conducted by the second
5 comparator indicates that the last measured level of electrical activity is lower than the
6 previously stored lowest measured level of electrical activity.

1 26. A device for controlling positive pressure assist to a patient as defined in claim
2 24, wherein the controller comprises:

3 a sub-controller of the increase of the ventilation feature in relation to the comparison
4 conducted by the second comparator between the last measured level of electrical activity
5 and the previously stored lowest measured level of electrical activity.

1 27. A device for controlling positive pressure assist to a patient as defined in claim
2 17, wherein the controller comprises:

3 a comparator of a last measured level of electrical activity of the patient's respiration-
4 related muscle during expiration to a previously measured lowest level of electrical activity
5 of the patient's respiratory-related muscle; and

6 a sub-controller of the level of positive pressure assist to the patient during expiration
7 in relation to the comparison conducted by the comparator between the last measured level
8 of electrical activity and the previously measured lowest level of electrical activity.

1 28. A device for controlling positive pressure assist to a patient as defined in claim
2 27, wherein:

3 the sub-controller increases the level of positive pressure assist to the patient during
4 expiration when the comparison conducted by the comparator indicates that the electrical
5 activity of the patient's respiratory-related muscle during expiration decreases.

1 29. A device for controlling positive pressure assist to a patient as defined in claim
2 27, wherein:

3 the sub-controller increases the level of positive pressure assist to the patient during
4 expiration when the comparison conducted by the comparator indicates that the electrical
5 activity of the patient's respiratory-related muscle during expiration has not ceased to
6 increase.

1 30. A device for controlling positive pressure assist to a patient as defined in claim
2 27, wherein the controller comprises:

3 a second comparator for determining whether the last measured level of electrical
4 activity is higher than a noise level before comparing the last measured level of electrical
5 activity to the previously measured lowest level of electrical activity.